DUMPING AND MARINE DEBRIS

Waterborne trash such as cans, bottles, ropes, packing materials, plastic bags, or medical waste are pollutants classified as marine debris. Rivers and oceans are dumping grounds for marine debris that ends up trapped in the shallow, enclosed waters of the bay. Such debris endangers wildlife with death from entanglement (from fishing line, lost or discarded fishing nets, and six-pack rings) and ingestion of bits of floating plastic (such as latex balloons and plastic pellets) which are mistaken for jelly fish, plankton, or other familiar foods. Marine debris also has economic costs because it jams propellers, clogs water intakes, and fouls fishing nets. Moreover, debris on beaches and in recreational waters adversely impacts tourism which has become the state's second most important economic sector.

While debris has numerous origins including inland sources such as manufacturing discharges and storm drain systems, most of it comes from off shore and can be traced to merchant ships, passenger lines, military vessels, commercial fishing boats, recreational boats, and oil and gas rigs. Nationwide, approximately 500 metric tons of waste are produced each year by the maritime industry, an indication that solutions should target shipping, fishing and cruiseline industries and should emphasize public/private cooperative programs. Marine debris from merchant shipping is primarily cargo packaging and covering, but also includes plastic sheeting and strapping bands. Galley wastes include kitchen trash, egg cartons, vegetable sacks, and jugs.

Because it is easily carried by wind and water, and is durable and abundant, plastic is the most damaging type of marine debris. It is most typically found in the marine environment in two forms: manufactured plastic products, and plastic resin pellets/spherules used to mold plastic items. Seventy to ninety percent of debris found on the Texas Gulf Coast shores is plastic. In addition, a 1990 study of floating debris in major U.S. harbors ranked the Houston Ship Channel first in plastic pellet debris. Plastic pellets are among the least evident debris discharged into the aquatic environment. It is thought that they accumulate in the stomachs of wildlife, ultimately causing starvation. They can also block the digestive system of these animals.

The study was conducted by EPA and TWC, who surveyed the HSC in February 1990 and again in September 1990. A large amount of debris was found in the upper reaches of the HSC, especially in Buffalo Bayou. Most of the debris came from stormwater discharges and consisted of plastic resin pellets, plastic pieces and bags, styrofoam cups and fast-food containers, toys, bottles, jugs, and general street litter. 113 different types of items were found, of which 62 percent were common to both surveys. Table 5-2 displays the survey's primary findings.

Plastic debris comprised over 98 percent of all debris collected in Houston, of which 98 percent was plastic pellets. These were more abundant in Houston than in any other harbor surveyed. Over 700,000 pellets of various sizes, shapes, and color were found in the five samples taken. One sample contained over

200,000 tiny pellets. Not surprisingly, the study identified several pellet extruding and processing plants along

Table 5-2
Most Common Items and their Ranking in Houston
(Highest 1, Lowest 10)

Item	Houston Ranking	
	Part I	Part II
Plastic Cap/lid pieces	9	8
Plastic filaments	4	4
plastic Miscellaneous plastic pieces	2	2
plastic Pellets/spherules	1	1
plastic cups, spoons, forks, straws	*	5
plastic Sheeting	7	7
Polystyrene beverage labels	5	7
Polystyrene Cups and bowls	6	6
Polystyrene Fast food containers	8	8
Polystyrene spheres	*	5
Polystyrene pieces smaller than a baseball	3	3
Miscellaneous rubber pieces	4	4
Miscellaneous living organisms	10	9

Source: Harbor Studies Program, US Environmental Protection Agency, Office of Water, EPA 842 R-92-001; April 1992, p. 6-25.

or near the HSC. The pellets are thought to enter the channel through stormwater, and also when pellet shipping containers get punctured during loading. Plastic powder (also used for plastic molds) was also found floating on the water's surface and was collected in considerable amounts. Polystyrene was the second largest item found. In contrast, Houston had the lowest percentage of sewage related debris (less than 1 percent).

Laws and regulations regarding dumping are related to marine debris and not specific to bay debris. Many of the laws to minimize marine debris were enacted several years ago, and yet volunteer clean up crews continue to collect tons of shoreline marine debris every year. It appears that the problem with marine debris is not a lack of legislation. In fact, marine and bay debris is much like nonpoint source pollution: it is created a little bit at a time by everyday human activities. Minimizing it, therefore, requires many individuals to change their habits and bear additional costs to improve the environment. Thus the most effective forms of legislation will provide for incentives rather than for

command-and-control regulation; for example, programs might provide an incentive for domestic and foreign vessels using bay area ports to dispose of their trash at the dock. Incentives to recycle and substitute degradable materials for nondegradable ones are other important components of a revised marine debris program.

REGULATORY FRAMEWORK

Federal Legislation

The Marine Plastic Pollution Research and Control Act of 1987 is the U.S. legislation that implements Annex V of the MARPOL international agreement which bans dumping of plastics at sea and regulates the disposal of other solid wastes. The Act prohibits the disposal of plastics into the marine environment and requires ports to provide reception facilities for ship-generated plastic waste. The Coast Guard enforces Annex V national regulations through routine boarding of boats scheduled for entry into US ports. Violators may be fined up to $50,000 and up to five years in prison. In addition to Annex V legislation, the Gulf has been proposed as a "Special Area" by the International Maritime Organization. "Special Area" status prohibits ships from dumping anything but food wastes into he Gulf. Foreign vessels entering U.S. ports must dispose of their food-related wastes (including wrappers, packaging, and containers) through incineration. Ports must provide a means of transporting the waste to local incinerators. Incineration companies normally provide boxes, and charge $25 per box for incineration. Use of all other vessel waste disposal facilities at U.S. ports is voluntary.

Operation Clean Sweep is a state program which, in the spirit of Annex V regulations, encourages all ports to provide facilities for debris collected by commercial fishermen. This program is currently in the pilot project stages and involves three Texas ports. Marinas on state-owned lands are also required to provide garbage disposal facilities. In an attempt to curb debris from offshore oil rigs, the General Land Office has also adopted rules prohibiting the dumping of solid waste from platforms and vessels operating in state waters under state permits.

Implementation

Federal and state activity in Texas is primarily organized around the Gulf of Mexico Program and its Marine Debris Subcommittee, which is composed of federal, state and local government, public interest organizations, citizens, scientific experts, and private interest groups. The subcommittee has three goals: to eliminate the illegal disposal and careless loss of waste; to eliminate existing debris; and to increase pride and understanding in the Gulf. The subcommittee has drafted an Action Plan for achieving these goals which focuses on objectives that are significant and achievable. Several of the "action items" in the plan are pertinent to the bay. These are discussed below:

Marine Debris Monitoring System and Related Data Base: EPA, the Center for Marine Conservation (CMC), NOAA, and the National Park Service are developing a monthly sampling program for monitoring type, quantity, and probable origin of marine debris. The Gulf of Mexico Program will be testing this in all five Gulf states in FY 1993. The program could be used as a prototype for developing a similar state model or even one that meets the specific data needs for the bay area. Improving the means and frequency of reporting amounts and types of marine debris will assist in monitoring the changing conditions of the bay. Existing data gathered from shoreline and bay park clean up projects could be used to develop a more sophisticated data base. Coast Guard data and port disposal data could eventually be incorporated into the data base.

Freshwater Inflow. The Gulf of Mexico Program also has a Freshwater Inflow Subcommittee. Their responsibilities include evaluation and analysis of select rivers as sources of marine debris. The San Jacinto and Trinity Rivers should be included in this program if they are not already. In addition, the EPA visited several pellet manufacturing plants in the watersheds draining into the Gulf and is developing recommendations for controlling pellet loss based on storm water permits.

Bay Ports. Because the channels in the bay area are among the most heavily traveled in the nation, they should be fully utilized for enforcing regulations regarding vessel waste and for providing incentive programs for proper waste disposal. Indeed, the U.S. regulations stemming from MARPOL Annex V rely on ports as trash collection sites. Yet, many port facilities are ill equipped to handle waste from ships. In the event that adequate facilities do exist, the expense of using them often acts as a deterrent to proper disposal. The Coast Guard conducted a survey of U.S. ports which concluded that trash reception facilities are available and adequate at all major ports visited, but services are often expensive and infrequently used.

These findings indicate that it would be worthwhile to document the costs of offloading trash in the bay area ports as well as the actual number of ships that offload trash. The Texas GLO has contracted with the Texas and Louisiana Seagrant offices to conduct a survey of Gulf of Mexico ports, terminal operators, and waste management operators to see how Annex V is being implemented. This survey will provide the means for a comparative study of trash disposal programs at Texas ports with an emphasis on user-friendly, cost-effective trash facilities. The Gulf of Mexico Program is adding to this by surveying vessel owner/operators. Funding could also be provided for the distribution of MARPOL Annex V educational posters and stickers that have been translated into foreign languages.

As more and more vessel trash is offloaded at port facilities, community planners will have to develop alternatives for handling the additional volume and nature of wastes that will be arriving in coastal cities. Existing regulations do not consider the impacts which may result from a sudden surge of garbage. Many coastal cities do not have adequate landfill capacity to handle the waste generated by their

own communities, let alone the ship wastes that are likely to generate over the next decade.

The Fishing Industry. The fishing industry dumps huge amounts of plastic each year including packaging, plastic nets lines and buoys. Plastic sheeting gets entangled in fishing nets. Trawling nets get snagged and torn on oil drums and other heavy objects. While new technology (such as biodegradable synthetic nets and fishing line) will play a role in reducing plastics in the ocean, recycling should be emphasized in the fishing industry. At present, Texas only encourages recycling, whereas Louisiana requires it. A study of recycling programs of ports and marinas would be helpful in developing the criteria and incentive mechanisms for a successful baywide program.

Recreational Boaters. The Coast Guard estimates that 1 to 1.5 pounds of solid waste is generated each day by each recreational boater. In 1989, Texas had the highest national incidence of boating and fishing waste. The Region Wide Boaters Pledge Program is a campaign to educate the recreational boater and fisherman about marine debris. Any person taking the pledge receives a "Stow it don't throw it" boat decal. Local officials should also attempt to distribute information about marine debris when issuing boating registration and fishing licenses, and when conducting boating safety courses.

Offshore Rigs. The Offshore Operators Committee is responsible for implementing sound solid waste management practices for the oil and gas industry in the Gulf. Waste management programs will include waste minimization through bulk packaging and reuse, sorting and recycling, and storage and transportation of solid waste in closed receptacles. Committee members are meeting with individual companies to promote these practices within the industry. The EPA is working with the state to assume responsibility for response, on-scene command, and funding for drum removal on state lands. A program for identifying drums that wash ashore from rigs will help target responsible companies. GLO is authorized to require off shore rigs within three miles of shore to present solid waste management plans including methods for collecting, storing, transporting, and disposing of trash generated on platforms and supply vessels. GLO routinely inspects offshore operations for compliance with these plans as well as for compliance with a state policy prohibiting the use of polystyrene products offshore.

Enforcement

Securing the financial resources for implementing the foregoing programs and for enforcement of MARPOL Annex V should be a priority among baywide planners. The laws and programs already available for controlling marine debris would be much more effective if adequately enforced. The Coast Guard, for example, must curtail its vessel-boarding activities because of a lack of manpower and funds. Coast Guard officials are limited to boarding vessels with prior violations of garbage regulations or ones that are entering a port for the first time. They do not have funds for patrolling at night when most dumping occurs. Finally, unless there is a blatant absence of waste on board, it is very difficult to

identify violations definitively through vessel inspections. For these reasons, special consideration and funding should be given to programs that provide an economic or other type of incentive for ships and boats to leave their trash at the port.

PUBLIC PARTICIPATION

Public participation is a particularly important component of marine debris programs—the more people who are involved, the more people who are likely not to contribute to the problem through dumping. However, public participation and local government involvement in responding to marine debris appears at the moment to be primarily focused on beach cleanup. The Adopt-a-Beach program is the chief mechanism for widescale public participation in controlling marine debris. The program has been very successful thus far. In 1990, over 15,000 volunteers in Texas cleaned 186 miles of beach, and collected 233 tons of debris. The program arranges for beaches to be cleaned three times a year, and educates the public on marine debris sources. The Take Pride Gulf Wide Initiative is a network of programs emphasizing local involvement. Cities and counties along the Texas coast spend millions of dollars each year on beach cleaning.

EVALUATION

Laws and regulations will not make marine debris disappear; incentives to prevent debris will work better. Limited enforcement resources should continue to be, as they are, focused on the large commercial ports and vessels entering them. However, other resources should be devoted to developing easy-to-use disposal facilities. Deposits on plastic containers, analogous to those many states place on glass bottles, along with reclaiming centers in the ports, might induce crews and owners to recycle their plastics, one of the most serious sources of marine debris. Success of this program in turn depends upon developing a market for recycled plastics, a goal beyond the scope of this report but one clearly endorsed by several Texas agencies. Public participation and outreach can be enhanced if local officials distribute information about marine debris when issuing boating registration and fishing licenses and when conducting boat safety courses. The Gulf of Mexico Program is implementing their Boater's Pledge Program in Texas in 1993.

SUMMARY EVALUATION: **SPILLS**

1. Problem. Spills of oil and industrial substances harm wildlife and water quality. Ever-increasing ship traffic, the maze of pipelines under the bay, and lack of clear oversight of ship speeds increase the likelihood of spills.

2. Authority. Most laws address developing a spill response plan and capability. Complex 4-tier response team mechanism instituted after Exxon Valdez spill. Authorities among the tiers and participating agencies clearer than before 1990. Pipelines are permitted by GLO but regulated by RRC.

3. Capacity. Changing. New laws call for much more coordination and planning. Unknown amount of private resources available for spill response; no comprehensive inventory of equipment or trained personnel in particular areas. Coastal Protection Fund available for state equipment purchases. Inadequate Coast Guard resources to board, inspect ships for spill plans and preventive procedures.

4. Policy. Pilots are licensed but otherwise unregulated despite the fact that many spills are a result of human error. No pipeline oversight by RRC. Focus on spill response rather than prevention.

5. Technical and environmental results. Two "minor" spills per day in Galveston Bay alone. No test of new system because no major spills since it was instituted.

6. Barriers and problems.
a. Two different Coast Guard districts in the Bay may impede coordination.
b. Pipeline leases give both GLO and Permanent School Fund revenue, encouraging GLO to issue leases rather than examine for environmental effects.
c. Prevention not a high priority, perhaps because prevention is so difficult.

7. Recommendations.
a. Create databases: of bayside facilities and substances that could be spilled; of response capabilities and a system for mobilizing them very rapidly; and of private contractors and their response capabilities.
b. Require pilots on all ships.
c. Impose mandatory use of Vessel Traffic Service (VTS) for all channel-going traffic and installing VTS in the 5 miles of the Houston Ship Channel where it does not exist.
d. Develop ideas to provide incentives for prevention, including deposit on plastic containers and increased crew accountability for spills.

SUMMARY EVALUATION: **DEBRIS**

1. Problem. Wastes from commercial and recreational vessels, especially plastics, are unsightly and harm wildlife.

2. Authority. Marine Plastic Pollution Research and Control Act of 1987 implements the international agreement that bans dumping of plastics at sea. GLO rules prohibit dumping solid waste from platforms and vessels in state waters under state permits.

3. Capacity. Low. Resources for the Coast Guard to board vessels are limited; inspections reveal little about dumping. Problem is highly dispersed and most dumping conducted under cover of night.

4. Policy. Debris appears to be a relatively low priority, in part because of the difficulty of doing anything about it.

5. Technical and environmental results. Environmental effects unclear; public concern about unsightly debris is high. 100,000 marine mammals and 1 million sea birds die each year.

6. Barriers and problems.
a. Disincentives to dispose properly.
b. Difficulty of identifying violators.
c. Many foreign vessels for which U.S. programs would not work.

7. Recommendations.
a. Create markets for recycled plastic and then impose a refundable deposit on plastic containers.
b. Educate the public at relevant points, especially when purchasing a boat license.
c. Help marinas take and dispose of wastes.

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